

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date  
14 October 2004 (14.10.2004)

PCT

(10) International Publication Number  
WO 2004/088294 A1

- (51) International Patent Classification<sup>7</sup>: G01N 21/896. (81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (21) International Application Number: PCT/GB2004/001093
- (22) International Filing Date: 15 March 2004 (15.03.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 0307345.9 29 March 2003 (29.03.2003) GB
- (71) Applicant (*for all designated States except US*): PILKINGTON PLC [GB/GB]; Prescot Road, St. Helens, Merseyside WA10 3TT (GB).
- (72) Inventors; and
- (75) Inventors/Applicants (*for US only*): HILL, Barry, Raymond [GB/GB]; 123 Ormskirk Road, Rainford, St Helens, Merseyside WA11 8JB (GB). ALDRED, Simon, Peter [GB/GB]; 8 Parsonage Gardens, Tarleton, Lancashire PR4 6NL (GB).
- (74) Agents: HALLIWELL, Anthony, Charles et al.; Group Intellectual Property Department, Pilkington European Technical Centre, Pilkington plc, Hall Lane, Lathom, Ormskirk, Lancashire L40 5UF (GB).

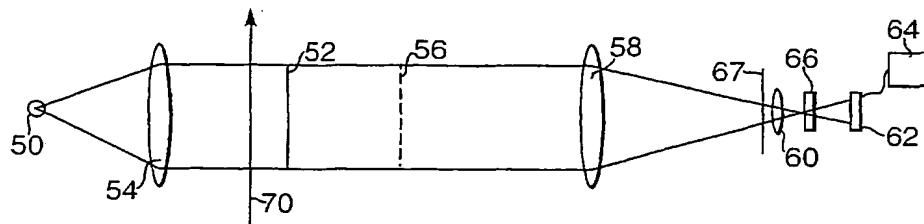
- (84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: GLAZING INSPECTION



WO 2004/088294 A1

(57) Abstract: A method of forming a shadowgraph image is described, comprising the steps of illuminating a glazing (52), e.g., a vehicle windscreen, with light from a localised light source (50), said light being expanded and collimated by a lens optical system (54) or a mirror optical system; forming a virtual shadowgraph image of the glazing in a virtual image plane (56), which may be positioned behind or in front of the glazing; and imaging the virtual image onto a CCD camera (62). The glazing may be moving relative to the light source or may be stationary. Furthermore, a method of glazing inspection is described, comprising forming a shadowgraph image as outlined above; processing the shadowgraph image to exclude measurement points corresponding to obscure areas of the glazing as non-valid measurement points; obtaining a processed image by determining an illumination value for each valid measurement point; constructing a reference image by scanning a convolution window point by point over the processed image; and comparing the illumination value of the corresponding point of the reference image.